

DOCUMENT RESUME

ED 164 135

PS 010 340

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TITLE Piaget's Concept of Adaptation and Its Value to Educators.
PUB DATE Feb 78
NOTE 17p.; Filmed from best available copy; Paper presented at the Annual International UAP-USC Conference on Piagetian Theory and the Helping Professions (18th, University of Southern California, February 3-4, 1973)
EDRS PRICE MF-\$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS *Adjustment (to Environment); Children; *Developmental Stages; Educational Environment; *Educational Methods; *Intellectual Development; Mathematics Instruction; Parents; Reading Development; Reading Material Selection; Reinforcement; Speeches; Teachers
IDENTIFIERS *Piaget (Jean)

ABSTRACT

Two types of adaptation can be conceptualized: the first dealing with the efforts of a child during the course of development to continuously improve the efficiency and economy of his or her intelligence, and the second dealing with responses to demands of the environment. This distinction is useful in conceptualizing the adaptive benefits of school activities. Teachers and parents assemble a major portion of the environment to which children ultimately adapt. They are obliged to consider how children adapt and to what they are asked to adapt. Learning to read, in particular, should be an active process. Reading instruction must permit children to construct the rules of reading. It is much more likely that children will be motivated to construct rules for reading (adaptation) while trying to decipher material they wish to comprehend rather than material they are not concerned with. In turning to the area of mathematics learning, the same principles that were described with respect to reading apply. It is very important for teachers and parents to understand why "spontaneous interests" are important and then make use of them in trying to encourage learning and development. Methods which use reinforcement techniques to direct the child's learning are counter-productive. (Author/RH)

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Piaget's Concept of Adaptation and its

Value to Educators¹

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For many years Piaget has been telling us that mental development (intellectual development, cognitive development) is a form of adaptation in the biological sense (Piaget 1952, 1969, 1971). For those of us who teach children or who teach teachers of children, I believe that Piaget's concept of adaptation can have communication value in trying to think about the practical application of Piagetian concepts.

Adaptation, from a biological point of view, is a process that an organism undergoes when it is confronted with an environmental change that necessitates some physical or behavioral change on the part of the organism. The giraffe presumably got its long neck by adapting to environmental requirements for attaining food. Similarly, Eskimos developed a way of life adapted to a harsh environment. I believe that when Piaget tells us that mental development is a form of adaptation in the biological sense, he is saying that intellectual development only proceeds when there is a genuine "need" for it to proceed, a need

¹ Paper prepared for presentation at the Eighth Annual International UAP-Southern California Piagetian Theory and the Helping Professions, University of February 3-4, 1978.

perceived at some level (disequilibrium) by the one developing. For Piaget, intellectual development only proceeds when there is some adaptive value in so doing.

Two Forms of Adaptation

For those of us interested in education and nurturing children's development and learning in a manner consistent with Piagetian theory, there are two forms of adaptation we can conceptualize. While both forms assume a child-environment interaction, one form of adaptation grows primarily from what I will call internal demands, and one form grows primarily from external demands.

Internal adaptation is "the adaptation of intelligence in the course of the construction of its own structures, which depends as much on progressive internal coordinations as on information acquired through experience" (Piaget, 1976, p. 11). When disequilibrium is evoked, assimilation and accommodation take place until equilibrium is restored. This internal self-regulatory process is adaptation of intelligence in the course of its development. Equilibrium, brought on by assimilation and accommodation, is adaptive because it leads to improved intellectual organization. Improved economy and efficiency are the outcome of each step of intellectual development.

Regarding concept formation (intellectual development), Elkind (1969) writes:

...the most general function concepts (and concept formation) serve is that of adaptation...the major function of the concept is the classification of new exemplars. By eliminating the need for fresh adaptations each time a new object is encountered, classification responses help to maintain the psychic economy (pp. 176-177).

Thus it can be seen that intellectual development is adaptive because it always leads to improved functioning.

The second form of adaptation (external) is "the adaptation of an organism to its environment during its growth" (Piaget, 1976, p.11). That is, the environment presents the child with, and the child perceives, certain problems ; inconsistencies, objects, and events which demand adaptation in the biological sense.

Two types of adaptation can be conceptualized: the first dealing with the efforts of the child during the course of development to continuously improve the efficiency and economy of intelligence within itself, and the second dealing with responses to demands of the environment. This distinction, while in part artificial, will hopefully be useful in conceptualizing the adaptive benefits of school activities. I believe very strongly that a question educators can and should be asking themselves at all stages of their work with children is, "What adaptive value does this experience have for children?" If Piaget is correct, intellectual development, and I believe some skill development, will not proceed efficiently unless there is some genuine adaptive value to the child in doing so. Also, if intellectual development does proceed, it is implied that there was some genuine adaptive value to the child .

Intellectual development: not automatic

Intellectual development is not automatic, even though it may seem to be at times. For example, all but a few children in all cultures learn to speak between the ages of two and four years. To my mind, the most difficult learning task we undertake in our lives is learning to talk at a very young age. As a form of communication, learning spoken language has tremendous adaptation value to the child.

The toddler who is able to say 'mama', 'milk', 'water', 'food' or 'hurt' gets his needs met (communicates) much more quickly and efficiently than one who has to rely on crying or another less effective form of communication (Wadsworth, 1978).

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The returns to the child for learning to speak, even for learning one word, are clearly adaptive. Communication is greatly facilitated. In my opinion, one of the reasons children learn spoken language is that it has genuine adaptive value. Nearly all children accomplish this difficult task with very little assistance from adults.

Some children do not learn spoken language between the ages of two and four. There can be many reasons why spoken language is not acquired at this time, including developmental delays, physiological disabilities, and forms of neurological damage. But another reason I have observed clinically is that some children have no need to develop spoken language--it has no adaptive value to them. I think particularly of one boy who was four years old and did not speak at all; a battery of exams showed no detectable difficulties. The boy's mother anxiously tried to anticipate everything the child wanted. She was very successful at meeting the child's needs without the child ever talking. The mother was like a helicopter constantly hovering over the child, anticipating his every need. The child and mother had established a very efficient communication system which never required talking by the child. In this instance, spoken language had no adaptive value to the child. Eventually, the child was placed in a normal pre-school program where it was anticipated that talking would be adaptive, and within a few weeks he was on his way to normal speech development.¹

¹
The delayed or different spoken language development of twins (multiple birth siblings) vs. non twins can be viewed in a similar way.

"Internal" Adaptation

Are there things that teachers and parents can do to help the child with "internal" adaptation--to make his intellectual system more efficient? I think the answer is clearly "yes"; in so doing, however, we must constantly keep in mind the adage, "you can lead a horse to water but you cannot make him drink". I might add that you cannot drink for him, either! Disequilibrium must occur within the child, and the child must assimilate and accomodate. The child must construct his own structures; it cannot be done for him. In this sense, we can never guarantee a child's response to a situation that seems, in our opinion, to have adaptive value to the child. On the other hand, without a world of physical objects and events outside the child, intellectual development would not proceed at all. As teachers and parents, we assemble a major portion of the environment to which children ultimately adapt. If we believe that children's development is adapted to the specific environment of that child, then we are obliged to consider how children adapt and what we ask them to adapt.

Learning Written Language Skills and "Internal" Adaptation

Reading, like spoken language, is a skill; it is not a form of knowledge as such (unlike mathematics which directly involve logical-mathematical knowledge). But learning to read does seem to have certain intellectual prerequisites if acquisition is going to be efficient. Among other things, children should be able to deal with the logical problem of the irregularities in written language, and should have constructed a concept that permits them to understand that signs--arbitrary representation like letters, words, numbers, etc.--represent real objects and events (Wadsworth, 1978). Without these prerequisites, a child is going to have a difficult time constructing

schemes for reading and writing. What follows are several considerations I believe can help the child successfully adapt to the problems of written language.

1. While learning to read is not a form of development itself, the child learning to read must construct a scheme(s) for reading in essentially the same way that he constructs cognitive structures in general. That is, the child must in a sense break the code of reading, and construct for himself through assimilation and accommodation the rules of reading. Thus, learning to read should be an active process. To be adaptive, reading instruction must permit children to construct the rules of reading.

2. The content of the child's reading activity should be clearly meaningful to the child. It is essential that children "discover" for themselves that written symbols (words, numbers) represent things. This is most likely to occur with words the child comprehends. The best source of such words, of course, is the child.

3. The child's engagement in reading should be "spontaneous". The child "knows" in a sense better than we do when he is 'ready' to read and when the environment is conducive to such learning.

4. Children learn to read on their own. The constructive process is an individual one (see Wadsworth 1978 for an expansion of this theme).

A reading program for a child that takes these considerations into account, as well as some others (see Wadsworth, 1978) is going to help foster the "internal" adaptation and make assimilation and accommodation of the reading process more effective. The general type of reading program that seems to consider most of these requirements is called the language-experience approach. I heartily endorse the suggestions made by Sylvia-Ashton Warner in her book, Teacher.¹

¹ See Wadsworth, 1978 for an expanded rationale for the utility of language-experience methods within a Piagetian framework.

Learning Written Language Skills and "External" Adaptation

The second form of adaptation, external, raises the question, "Why should children learn to read?" What is there in the environment that motivates children to learn to read? To Piaget, this is the most interesting question about reading.¹ In its initial stages, learning to read does not have the same adaptive value as learning spoken language. The child who learns to speak one word has made his communication system more effective. The child who learns to read or write one word or several words has not improved his communication system significantly. In general, for communication purposes, spoken language remains faster and more efficient than written language. Reading skills have to become fairly well-developed before they begin to have real and significant communication value to the child--communication that cannot be obtained through spoken language more easily.

Are there ways, by manipulating the educational environment, to increase the adaptive value of learning written language? I believe there are. If as educators we wanted to develop language skills as quickly as possible without regard for other educational considerations, the way to do so would be to banish spoken language from the classroom and from the child's life at the onset of reading instruction. If we instituted such harsh methodology, we would in effect create a genuine need for a form of communication other than spoken language. We would dramatically increase the adaptive value of learning written language. I am persuaded that if this were actually done, (and I am not suggesting it should be), children in such a situation would learn to read and

¹ The author asked Piaget at a conference several years ago to share his thoughts about children's learning to read. Piaget indicated that he had never studied reading and had not researched the topic, but if he were to do so he would look at motivation. He noted that while many children have difficulty learning to read, many learn to read spontaneously on their own.

write more quickly than they do now, and probably much more effectively.

The situation that in part replicates this, of course, is deaf children who are deprived of spoken language. There is clearly "adaptive" value to deaf children to master written language. Even so, deaf children lag behind hearing children in their development of reading and writing skills, probably due to a lack of early spoken language experience. There is some evidence that if deaf children are given non-verbal language experience during their early ^{years} (two to four years) they learn to read at least as rapidly as hearing children and at least as well (Pugh, 1946; Thompson, 1927; Hofsteter, 1974).

While none of us would sanction the method of banishing spoken language I have described, such a conceptualization permits us to think of other things we might do that are less drastic, but preserve some of the adaptive value-enhancing characteristics of such an idea. To some extent, this can be achieved by having a certain amount of classroom communication that involves written language. Communications to students like messages, directions, daily and weekly notices, etc., can be written ^{and by} students rather than spoken. In addition, significant blocks of time during the day can be set aside when only written language can be used; no spoken language is permitted. I have not seen this done, but I believe that if it were instituted creatively it would be very effective and not jeopardize other educational goals. Other things that encourage writing as well as reading, and can have legitimate adaptive/communication value are school or class newspapers, letters of various sorts, etc.

¹ Another practice that certainly helps children discover that words mean (represent) real things is to cover the classroom (and home) with signs.

A unique approach to working with delinquent non-reading adolescents is described by Shore and Massimo (1966) which illustrates the usefulness of the adaptation concept. They describe a program for rehabilitating delinquent adolescents that involved learning to read as part of the therapy. Non-reading delinquents were placed in jobs where the employer had agreed to take part in the therapy process. The adolescent was permitted to become comfortable in the job and to overcome any feelings of threat from others. Typically, the adolescents had become completely alienated from the school system and saw themselves as failures and incapable of learning to read. When the adolescent appeared to have become accustomed to his new job and to the people he had to work with, calculated reading demands were carefully introduced. A boy working in an auto repair shop might be asked by one of his fellow workers to get "five quarts of 20 weight high detergent oil". Some request of this type would be made which required some reading. The boy in this case was faced with a crucial reading problem. He had to figure out which oil was the correct oil. Once he had found the oil, even if it required the help of others, he was typically highly motivated to remember how to identify that particular oil. Shore and Massimo state that the crucial point in therapy is at the time the initial reading demands are placed on the boy. If the adolescent's feeling of being threatened has been diminished sufficiently, then he does not try to avoid the "reading problem" and tries to learn what is required. Simple reading tasks of this nature are introduced more frequently if there is success. A therapist oversees the boy's program. At some point the boy typically comes to realize he is doing some "reading" and is capable of learning to read. At this point, an important psychological barrier has been overcome. The boy's expectations of what he is capable of have changed.

The important characteristics of the type of program described by Shore and Massimo (1966) is that the content of reading is clearly meaningful to the "student" and learning to read is highly adaptive. The boy in the case described was highly motivated to be able to do what was asked of him.

Children should be encouraged to read things that are interesting to them. It is much more likely that children are going to be motivated to construct rules for reading (adaptation) while trying to decipher material they wish to comprehend rather than material they are really not concerned with. If the reading efforts a child makes are not active--in the Piagetian sense--then they are probably of little value.

Mathematics Learning and Adaptation

In turning to the area of mathematics learning, the same principles that were described with respect to reading apply. Indeed, the problem of dealing with numbers is in large part a reading problem. "Internal" adaptation (the child making increasingly more order of his intellectual schemes) can be facilitated by teachers who employ methods that permit the child to be active, and which employ sufficient "concrete" opportunities for children to develop logical-mathematical concepts before being encouraged to deal with the relevant symbols. In mathematics instruction too little attention is paid to comprehension of concepts, which has adaptive value; too much attention is paid to computation, which has no "internal" adaptive intellectual value. Most public school math programs seem to be based on manipulation of symbols (computation).

"External" adaptation can be facilitated by creating in the child's environment a genuine need to use and develop mathematical concepts. This may seem hard to do since it is not in keeping with the way most of us have been taught mathematics, but the inescapable conclusion is that if we are not able to give math experiences more adaptive value, we are unlikely to improve the quality of what is learned.

Providing children with "concrete" tasks that require exercise of number concepts, like getting enough pencils for everyone in the class, are in order. Traditional activities like a "store" can be developed so that the requirement for the use of mathematical concepts becomes quite sophisticated. Games which employ mathematical concepts and computation are certainly useful. Because I am not a creative mathematician myself, I shall leave the generation of practices in this realm to others¹.

Experiences that have adaptation value to children are those that set off the disequilibrium mechanism and activate assimilation (internal), and those which the environment brings to bear on the child (external). The experiences children seek themselves and are revealed through their "spontaneous interests" frequently result in a better match between the child and instruction than the teacher can make. In a very real sense, the child is more accurately aware of what experiences are going to have adaptive value to him than is the teacher. Thus it is very important for teachers and parents to understand why "spontaneous interests" are important and then make use of them in trying to encourage learning and development.²

¹ See Nuffield Mathematics Project (see bibliography); Copeland, (1974); Dienes (1971); Dienes and Golding (1973; Brearly (1970).

² See Wadsworth (1978, 1971) for the significance of spontaneous interests in Piagetian theory.

Reinforcement and Adaptation

Behaviorist theorists argue that the motivation or "adaptive force" that activates development and learning is "reinforcement" and that if one properly manipulates environmental reinforcers, learning and development can be achieved. This assumption and belief runs counter to Piagetian views with regard to the development of physical and logical-mathematical knowledge (Wadsworth, 1978). Piagetian views conclude that the motivating forces for development are (1) the "need" to restore equilibrium when it is disrupted, and (2) the "need" to adapt to the environment. In these cases, the payoff (adaptive value) or reinforcement is "internal": improved organization and intellectual functioning.

In my view, teacher or parent methods which use "reinforcement" techniques to direct the child's learning of physical knowledge and logical mathematical knowledge are in principle counter-productive. If strong reinforcers are used, children can be persuaded to disregard their own disequilibrium and spontaneous interests in favor of the compelling reinforcers. Children can be persuaded to choose reinforcers rather than follow their own intuitive methods, which are more adaptive. Piaget tells us we must not forget that children must actively construct all knowledge. This requires their active attention to disequilibrating experiences--a focus very different from a focus on reinforcers. Whether in the process of developing mathematical concepts or learning to read, learning and development provide their own feedback and reinforcement (Wadsworth, 1978).

reinforcement

This is not an argument for the complete abandonment of/techniques--only against using them to direct children's learning and development of physical and logical mathematical knowledge. We all need reinforcement of one sort or another to keep our lives intact. Also, many Piagetians, including myself, believe that reinforcement plays a crucial role in the efficient development of what is called social or social-arbitrary knowledge (Kamii, 1973; DeVries, 1973;

Wadsworth, 1978). Also, there are times when we want children to acquire certain behaviors which for purposes of safety, etc., are deemed necessary (e.g. Do not cross streets when cars are coming.). We recognize the foolishness of waiting for such concepts to develop and do not hesitate to use reinforcement techniques. In these instances we are not striving for comprehension. The behavioral response is sufficient.

It is possible to relate the concept of adaptation to the area of learning problems. There are of course many different causes for learning problems. Many children develop inefficient methods of functioning which perplex adults. The methods that children work out to learn and do things, even if they are very inefficient from an adult perspective, frequently have some clear adaptive value to the child at the time of their incorporation. For example, using kinesthetic awareness¹ is the most efficient way to control all muscular movement, whether in writing, reading, or walking, etc. Some children do not develop kinesthetic awareness, or develop it only to a limited degree. For these children, movement of all types becomes a major problem. The typical adaptation for such children is to develop visual control of movement. Visual control of movement is inefficient compared to kinesthetic control of movement but it is better than nothing and has adaptive value at the time of incorporation because visual control is better than no control.

Because movement is so central to human functioning, the effective treatment of children who rely on visual control of movement (getting them to abandon visual control of movement and develop kinesthetic control) requires consideration

¹ Kinesthetic awareness is the internal awareness of the movement of body muscles.

of their initial adaptation. The only effective measures I know of for establishing kinesthetic control of movement in children who have not developed require the elimination of visual control (blindfolding) during the training procedures. That is, the original adaptive value of visual control needs to be eliminated while the adaptive value of kinesthetic control is trained into the child (Wadsworth 1978; Grzynkiewicz and Kephart, 1975).

Some might consider the four-year-old who did not talk to have a learning problem; in reality, the development of spoken language did not have any adaptive value to the child at the time. The child did not have any difficulty developing spoken language as soon as he was put in an environment where spoken language was necessary for communication (adaptive value). It may be suggested that some of the children we see who have symptoms which suggest learning problems may not have problems learning. The problem, in some cases, may be that it has never been adaptive for them to learn particular things. Also, some children's inefficiencies and difficulties can be traced to developments that were adaptive at the time the method for functioning was established. Treatment of these cases requires consideration of their original adaptations.

In closing, I suggest it is of value to us as educators to keep in mind Piaget's belief that intellectual development is a form of adaptation to the environment. Children do adapt and we need to ask ourselves, "To what do we want children to adapt?" Equally important when working with children is how children adapt, how intellectual development proceeds.

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